AMENDMENTS TO THE CLAIMS:

1-45. (Canceled)

46. (Withdrawn) A method for modifying a dielectric constant of a dielectric material, comprising:

relieving said dielectric material, wherein said dielectric constant of said material is reduced.

47. (Withdrawn) The method of Claim 46, wherein said step of relieving comprises:

forming a plurality of holes in said dielectric material.

48. (Withdrawn) The method of Claim 47, wherein said holes are spaced about a triangular lattice.

49. (Withdrawn) The method of Claim 47, wherein said step of forming a plurality of holes comprises drilling a plurality of holes.

50. (Withdrawn) The method of Claim 47, wherein said holes have a diameter d and a center to center hole spacing S, and wherein $d < \lambda/64$ and $S < \lambda/64$, where λ is equal to a wavelength of a highest operating frequency of an antenna formed using said dielectric material.

51. (Withdrawn) The method of Claim 50, wherein said step of forming comprises selecting a value for d, wherein an unmodified dielectric constant of said material is equal to e_r, and wherein $S = 0.9523\ d\ \sqrt{\frac{(e_r - 1)}{(e_r - e_m)}}$, where e_m is a modified dielectric constant of said dielectric material.

52. (Withdrawn) The method of Claim 46, wherein said reduced dielectric constant is given by $e_m=e_r-0.25(e_r-1)\pi d^2/0.866S^2$, where e_m is a modified dielectric constant of said material, where e_r is the dielectric constant of the material in the absence of holes, where S is the nearest neighbor spacing between the holes, and where d is the diameter of the holes.

53. (Withdrawn) The method of Claim 47, wherein said holes are formed in at least a first area of said dielectric material and wherein said holes are not formed in at least a second area of said dielectric material, the method further comprising:

forming a first plurality of radiator elements adjacent said at least a first area of said dielectric material;

forming a second plurality of radiator elements adjacent said at least a second area of said dielectric material, wherein at least a portion of an antenna system is formed.

54. (Withdrawn) The method of Claim 53, wherein a dielectric constant presented to said first plurality of radiator elements is a reduced dielectric constant, and wherein a dielectric constant presented to said second plurality of radiator elements is not reduced.

55. (Withdrawn) The method of Claim 46, wherein said reduced dielectric constant comprises a reduced effective dielectric constant at a first radio frequency relative to an effective dielectric constant at said first radio frequency of said dielectric material absent modification.

56. (Currently Amended) An antenna apparatus, comprising:

a dielectric material having at least a first relieved portion, wherein a dielectric constant of said dielectric material is modified in an area of said at least a first relieved portion, wherein said at least a first relieved portion defines a volume that does not contain a conductive material; and

at least a first radiator element interconnected to said dielectric material.

57. (Previously Presented) The apparatus of Claim 56, wherein said at least a first radiator element is on a first side of said dielectric material, said antenna further comprising a ground plane on a second side of said dielectric material.

58. (Previously Presented) The apparatus of Claim 56, wherein said at least a first relieved portion of said dielectric material comprises a hole.

59. (Currently Amended) The apparatus of Claim 56, wherein said at least a first relieved portion of said dielectric material comprises a plurality of holes, wherein said at least a first radiator element passes across an end of at least one of said holes, and wherein said holes do not contain a conductive material.

60. (Previously Presented) The apparatus of Claim 59, wherein said plurality of holes are arranged in a triangular pattern.

61. (Previously Presented) The apparatus of Claim 59, wherein said plurality of holes are arranged in an equilateral triangular pattern.

62. (Currently Amended) ~~The apparatus of Claim 56,~~ An antenna apparatus, comprising:

a dielectric material having at least a first relieved portion, wherein a dielectric constant of said dielectric material is modified in an area of said at least a first relieved portion;

at least a first radiator element interconnected to said dielectric material

wherein said dielectric constant of said dielectric material in an area of said at least a first relieved portion is equal to e_m, wherein $e_m=e_r-0.25(e_r-1)\pi d^2/0.866S^2$, where e_r is the dielectric constant of said dielectric material without modification, where S is a center to center spacing between said holes, and where d is a diameter of said holes.

63. (Currently Amended) ~~The apparatus of Claim 60,~~ An antenna apparatus, comprising:

a dielectric material having at least a first relieved portion, wherein a dielectric constant of said dielectric material is modified in an area of said at least a first relieved portion;

at least a first radiator element interconnected to said dielectric material;

wherein said at least a first relieved portion of said dielectric material comprises a plurality of holes;

wherein said plurality of holes are arranged in a triangular pattern; and

wherein said plurality of holes have a diameter d and a center to center hole spacing S, and wherein $d < \lambda/64$ and $S < \lambda/64$, where λ is equal to a wavelength of a highest operating frequency of said antenna.

64. (Previously Presented) The apparatus of Claim 63, wherein S is greater than d.

65. (Currently Amended) An antenna apparatus, comprising:

a dielectric material having at least a first relieved portion, wherein a dielectric constant of said dielectric material is modified in an area of said at least a first relieved portion;

at least a first radiator element interconnected to said dielectric material;

wherein said at least a first relieved portion of said dielectric material comprises a plurality of holes;

wherein said plurality of holes are arranged in a triangular pattern; and

wherein said unmodified dielectric constant of said dielectric material is equal to e_r, and wherein $S = 0.9523\ d\ \sqrt{\frac{(e_r - 1)}{(e_r - e_m)}}$, where e_m is a modified dielectric constant of said dielectric material, where S is a center to center spacing between holes, and where d is a diameter of the holes.

66. (Previously Presented) The apparatus of Claim 56, wherein said dielectric material comprises a sheet of dielectric material.

67. (Previously Presented) The apparatus of Claim 56, further comprising a plurality of antenna elements interconnected to at least a first surface of said dielectric material.

68. (Currently Amended) The apparatus of Claim 56, further comprising:

a first plurality of antenna elements comprising a first array on a first surface of said dielectric material, said first plurality of antennaradiator elements including said first radiator element; and

a second plurality of antenna elements comprising a second array on said first surface of said dielectric material and interlaced with said first plurality of antenna elements.

69. (Previously Presented) The apparatus of Claim 68, wherein said dielectric material is relieved in areas corresponding to said first plurality of antenna elements, wherein a first dielectric constant is presented to said first plurality of antenna elements, and wherein a second dielectric constant is presented to said second plurality of antenna elements.

70. (Previously Presented) The apparatus of Claim 69, wherein said dielectric material is not relieved in areas corresponding to said second plurality of antenna elements.

71. (Previously Presented) The apparatus of Claim 69, wherein said first and second arrays are arranged about first and second rectangular lattices having a first lattice spacing.

72. (Previously Presented) The apparatus of Claim 71, wherein said first array has a first frequency of operation (f_1), wherein said second array has a second frequency of operation (f_2), wherein said first dielectric constant is equal to er_1, and wherein said second dielectric constant (e_{r2}) is given by the expression $e_{r2}=e_{r1}*(f_1/f_2)^2$.

73. (Previously Presented) The apparatus of Claim 68, wherein an area occupied by said first array substantially overlaps an area occupied by said second array.

74. (Previously Presented) The apparatus of Claim 68, further comprising a plurality of signal amplifiers, wherein at least one amplifier is associated with each radiator element of said first and second arrays.

75. (Currently Amended) An antenna apparatus, comprising:

means for radiating at least a first radio frequency;

means for providing at least a first dielectric constant adjacent ~~a first side of~~ said means for radiating at least a first radio frequency, wherein at least a portion of said means for providing at least a first dielectric constant includes ~~a~~is relieved portion at a first location adjacent said means for radiating at least a first radio frequency; and

means for providing a ground plane on a second side of said ~~dielectric~~ means for providing at least a first dielectric constant opposite said means for radiating, wherein said means for radiating and said means for providing a ground plane are not electrically interconnected to one another by an electrically conductive material passing through said means for providing at least a first dielectric constant at said first location.

76. (Previously Presented) The apparatus of Claim 75, further comprising:

means for radiating at least a second radio frequency; and

means for providing at least a second dielectric constant adjacent said means for radiating at least a second radio frequency.

77. (Currently Amended) ~~The apparatus of Claim 75,~~ An antenna apparatus, comprising:

means for radiating at least a first radio frequency;

means for providing at least a first dielectric constant, wherein said means for radiating at least a first radio frequency is adjacent a first side of said means for providing a dielectric constant, wherein at least a portion of said means for providing at least a first dielectric constant is relieved adjacent said means for radiating at least a first radio frequency;

means for providing a ground plane on a second side of said means for providing at least a first dielectric constant;

means for radiating at least a second radio frequency; and

means for providing at least a second dielectric constant adjacent said means for radiating at least a second radio frequency;

wherein at least a portion of said means for providing at least a second dielectric constant is relieved adjacent said means for radiating at least a second radio frequency.

78. (Previously Presented) The apparatus of Claim 76, wherein said means for providing at least a first dielectric constant is integral with said means for providing at least a second dielectric constant.

79. (Previously Presented) A method for providing an antenna component, comprising:

selecting a first radio frequency having a first wavelength (λ_1);

selecting a material having a dielectric constant (e_r) that is greater than at least a first desired dielectric constant;

selecting a first hole diameter (d_1) that is less than the first wavelength (λ_1); and

forming a number of holes of the first selected diameter (d_1) in the selected material to obtain a modified dielectric constant (e_{m1}) that is less than the dielectric constant (e_r) of the selected material without the holes.

80. (Previously Presented) The method of Claim 79, further comprising:

calculating a hole spacing (S_1), wherein $S_1 = c^* d_1^* \sqrt{\frac{(e_r - 1)}{(e_r - e_m)}}$.

81. (Previously Presented) The method of Claim 80, wherein c is a constant having a value less than one.

82. (Previously Presented) The method of Claim 80, wherein c has a value equal to about 0.9523.

83. (Previously Presented) The method of Claim 80, wherein the hole spacing (S_1) is a center to center spacing of adjacent holes.

84. (Previously Presented) The method of Claim 79, wherein the selected first hole diameter (d_1) is less than $\lambda_1/64$.

85. (Previously Presented) The method of Claim 80, wherein the holes are located such that they have a center to center hole spacing (S_1) that is less than $\lambda_1/64$.

86. (Previously Presented) The method of Claim 79, wherein the holes are arranged in an equilateral triangular pattern in the selected material.

87. (Previously Presented) The method of Claim 79, wherein the holes having the first selected diameter (d_1) are formed in at least a first area of the selected material, wherein holes are not formed in at least a second area of the selected material, said method further comprising:

selecting a second radio frequency having a second wavelength (λ_2); and

selecting a second desired dielectric constant, wherein the dielectric constant of the material (e_r) is equal to the second desired dielectric constant.

88. (Previously Presented) The method of Claim 79, wherein the holes having the first selected diameter (d_1) are formed in at least a first area of the selected material, the method further comprising:

selecting a second radio frequency having a second wavelength (λ_2);

selecting a second hole diameter (d_2) that is less than the second wavelength (λ_2);

forming a number of holes of the second selected diameter (d_2) in a piece of the selected material to obtain a second modified dielectric constant (e_{m2}) that is less than the dielectric constant (e_r) of the selected material without the holes, wherein the holes of the second selected diameter (d_2) are formed in at least a second area of the material.

89. (Previously Presented) The method of Claim 88, wherein the holes of the first selected diameter (d_1) and the holes of the second selected diameter (d_2) are formed in the same piece of the selected material.

90. (Previously Presented) The method of Claim 79, further comprising:

selecting a second radio frequency having a second wavelength (λ_2);

selecting a desired scan range for the first radio frequency;

calculating a first lattice spacing between a first plurality of radiator elements associated with said first radio frequency, wherein said first lattice spacing comprises a function of the wavelength (λ_1) of said first radio frequency and the selected scan range of the first radio frequency;

selecting a desired scan range for the second radio frequency;

calculating a second lattice spacing between a second plurality of radiator elements associated with the second radio frequency, wherein the second lattice spacing comprises a function of the wavelength (λ_2) of the second radio frequency and the selected scan range of the second radio frequency;

determining a maximum lattice spacing, wherein the maximum lattice spacing is the smaller of the first and second lattice spacings, wherein the first plurality of radiator elements is arranged about a square lattice, wherein the first plurality of radiator elements have a center to center spacing equal to the maximum lattice spacing, wherein the second plurality of radiator elements is arranged about a square lattice, and wherein the second plurality of radiator elements have a center to center spacing equal to the maximum lattice spacing;

calculating a dielectric constant for the second plurality of radiator elements, wherein the second substrate dielectric constant comprises a function of the modified dielectric constant, the first center frequency, and the second center frequency;

calculating an effective size of the radiator elements included in the first plurality of radiator elements and the radiator elements included in the second plurality of radiator elements, wherein the effective size comprises a function of a wavelength of a one of the first and second frequencies and a corresponding one of the first and second substrate dielectric constants;

calculating a physical size of the radiator elements included in the first plurality of radiator elements; and

calculating a physical size of the radiator elements included in the second plurality of radiator elements.

91. (New) An antenna apparatus comprising:

at least a first radiator element;

a dielectric material interconnected to the at least a first radiator element, said dielectric material including:

a first surface;

a second surface opposite and substantially parallel to said first surface; and

at least a first relieved portion, wherein an electrically conductive material does not extend from a first one of said first and second surfaces to a second one of said first and second surfaces through the at least a first relieved portion.